electrolyte body arranged between the Nernst electrode and the reference electrode;

a pump cell including:

an inner pump electrode exposed to the gas mixture via the diffusion barrier, an outer pump electrode exposed to the gas mixture, and a solid electrolyte body arranged between the inner pump electrode and the outer pump electrode;

a joint supply conductor section through which the Nernst electrode and the inner pump electrode are connected [at least in some sections] to a circuit arrangement for controlling and evaluating the probe; and

B1 a loaded voltage divider including a plurality of resistors that are arranged such that a negative feedback of a Nernst voltage circuit and of a pump voltage circuit is optimized, the plurality of resistors including a joint supply conductor resistor associated with the Nernst electrode and the inner pump electrode.

REMARKS

Claim 6 has been amended to clarify the subject matter contained therein. It is respectfully submitted that the amendment does not add new matter and puts claim 6 in condition for allowance and/or in better form for appeal.

Claims 6-12 are currently pending in this application. Claims 6-12 were rejected under 35 U.S.C. § 112, first and second paragraphs. Respectfully, Applicants kindly request reconsideration in view of the arguments below.

I. THE REJECTION OF CLAIMS 6-12 UNDER 35 U.S.C. § 112, FIRST PARAGRAPH

Claims 6-12 were rejected under 35 U.S.C. § 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with

which it is most nearly connected, to make and/or use the invention. Specifically, the Final Office Action contends that Applicants have only shown a configuration of resistors that connect the inner pumping electrode to the Nernst electrode, without describing the Nernst voltage circuitry or the pump voltage circuitry, which apparently utilize the configuration of resistors to achieve negative feedback.

As stated by the Examiner, the term "negative feedback," as it is conventionally understood to persons having ordinary skill in the art, implies that the output of an amplification stage is fed back into an input of the amplification stage so that the overall gain of he amplification stage is reduced. In this sense, the Examiner is correct, and it is well known in the art to use a conventional amplifier to control a gas sensor. As the negative feedback to a conventional amplifier increases, the overall gain of the amplifier is reduced, thereby achieving a reduction in the amplitude of a ripple about lambda = 1, the ripple being caused by the Nernst voltage circuit and the pump voltage circuit being linked by a joint supply conductor. However, as the negative feedback increases, the pump current supplied to the pump cell is reduced. If the pump current is reduced below a certain minimum pump current, the pump cell may cease to operate correctly. Therefore, the requirements of the pump cell impose an upper limit on the negative feedback of the Nernst cell.

repeat of previous comments

The loaded voltage divider recited in claim 6 is designed to increase the negative feedback without causing the pump current to drop below the minimum pump current required to effectively operate the pump cell. In this manner, the resistors of the voltage divider may be fine-tuned to permit a maximum amount of negative feedback.

However, besides resistors R1, R2, and R3, the negative feedback and pump current of a pump cell are functions of various other complex factors, which prevent a manufacturer

of the pump cell from freely choosing the resistors. These factors include, for example, the geometry of the pump cell, the thickness of the electrolyte used in the pump cell, the specific materials used, and the temperature of the pump cell. As a result, the manufacturer of the pump cell must engage in some trial and error to select the appropriate resistors R1, R2, and R3. For this purpose, the manufacturer may, for example, increase the resistance of the common conductor R3 by changing the cross section of R3, so that an output voltage U_p is reached, which is minimally sufficient for generating the pump current I_p.

What does the inventor do by contrast?

The test for enablement is whether a person reasonably skilled in the art could make or use the invention as claimed from the disclosure of the patent coupled with information known in the art, without **undue** experimentation. See In re Wands, 858 F.2d 731, 737 (Fed. Cir. 1988).

The Final Office Action contends that the various claims under consideration are not enabled by the Specification, since the claims do not recite an amplification stage purportedly required to produce negative feedback and since Applicants have not explained how the resistors are chosen to "optimize" the negative feedback.

However, as stated above, enablement does not require an exhaustively detailed disclosure to teach a person reasonably skilled in the art to make or use the invention, but rather enablement requires only that level of disclosure necessary so that a person reasonably skilled in the art could make or use the invention, **without undue experimentation**. Thus, in contrast to the contentions in the Final Office Action, enablement does not require that the Specification provide a detailed formula for selecting the resistors R1, R2, and R3. All that is required is the level of detail necessary so that a person with ordinary skill in the art can make and use the probes recited in claims 6-12. As stated above, the "optimum" selection of resistors can be determined with some trial and

I agree... but,

again agree, but appl. cant has not provided any details

Still, what does "optimum" mean

error experimentation. However, the trial and error required is by no means undue and, as such, claims 6-12 are enabled.

For at least the foregoing reasons, Applicants kindly request that the rejection of claim 6 under 35 U.S.C. § 112, first paragraph, be withdrawn. Further, to the extent that claims 7-12 were rejected under 35 U.S.C. § 112, first paragraph, as being dependent upon claim 6, Applicants also kindly request that the rejection of these claims be withdrawn for at least the same reasons as discussed above with respect to claim 6.

II. THE REJECTION OF CLAIMS 6-12 UNDER 35 U.S.C. § 112, SECOND PARAGRAPH

Claims 6-12 were rejected under 35 U.S.C. § 112, second paragraph, for failing to particularly point out and distinctly claim the subject matter which Applicants regard as their invention.

As regards claim 6, the Final Office Action asserts that the limitations drawn to the "joint supply conductor" are confusing and unclear. Specifically, it is asserted that the metes and bounds of the Nernst and inner pump electrodes being connected "at least in some sections" are unclear, and that the use of the term "joint supply conductor resistor" is unclear.

Without agreeing with the merits of the above argument, Applicant has amended Claim 6 to clarify the subject matter contained therein. Specifically, claim 6 has been amended to remove the phrase "at least in some areas." The pertinent parts of claim 6 now recite "a joint supply conductor section through which the Nernst electrode and the inner pump electrode are connected to a circuit arrangement for controlling and evaluating the probe."

As further regards claim 6, the Final Office Action asserts that the presence of a loaded voltage divider including "a plurality of resistors" appears to refer to the combination of resistors R1, R2, and R3 of the various Figures. Thus, the

Final Office Action states that it is unclear what would constitute the "joint supply conductor resistor" if the plurality of resistors includes the combination of resistors R1, R2, and R3.

Without agreeing with the merits of the above assertion made by the Examiner, Claim 6 has been amended to clarify the subject matter contained therein. Specifically, claim 6 has been amended to recite "a loaded voltage divider including a plurality of resistors that are arranged such that a negative feedback of a Nernst voltage circuit and of a pump voltage circuit is optimized, the plurality of resistors including a joint supply conductor resistor associated with the Nernst electrode and the inner pump electrode." It is respectfully submitted that newly amended claim 6 makes clear that the plurality of resistors include the joint supply conductor resistor.

As further regards claims 6-7, the Final Office Action asserts that the limitations drawn to the joint supply conductor are unclear because cooperation between the various components of the joint supply conductor and the Nernst and pump electrode are not clearly established. The Final Office Action contends that claim 6 vaguely specifies an arrangement of resistors to accomplish a vaguely defined function (i.e., "optimizing" or "maximizing" negative feedback).

As stated above, the loaded voltage divider recited in claims 6-7 is designed to increase the negative feedback without causing the pump current to drop below the minimum pump current required to effectively operate the pump cell. In this manner, the resistors of the voltage divider may be fine tuned to permit a maximum amount of negative feedback. Thus, it is clear what constitutes "optimized" or "maximized," i.e., "optimized" or "maximized" negative feedback may be accomplished by choosing the resistors of the voltage divider such that the negative feedback is as high as possible, without adversely affecting the pump cell. Since there is a definitive

point at which the pump current becomes too low for effective operation of the pump cell, the metes and bounds of "optimized" and "maximized" are absolutely clear.

As regards claim 10, the Final Office Action asserts that it is unclear what the metes and bounds of the "minimized" cross section of the conductor section. Specifically, the Final Office Action contends that the term "minimized" is not defined by the claims, and the Specification does not provide a standard for ascertaining the requisite degree of the term. Respectfully, Applicants disagree.

Reducing the cross section is another way to increase the resistance value of the joint supply conductor section, which means reducing the cross section of the joint supply conductor section is another way of increasing negative feedback between the Nernst voltage circuit and the pump voltage circuit. (Specification, page 3, lines 22-23). However, as explained above, as the negative feedback increases, the pump current supplied to the pump cell is reduced. If the pump current is reduced below a certain minimum pump current, the pump cell may cease to operate correctly. Therefore, the requirements of the pump cell impose an upper limit on the negative feedback of the Nernst cell, and as such, a minimum cross section for the joint supply conductor. Thus, the Specification clearly defines the metes and bounds of the term "minimized," as that term is used in claim 10.

As regards claim 11, the Final Office Action asserts that it is unclear how the specified printed conductor sections and contact point cooperate with the other specified elements of the invention, namely, the voltage divider resistors. Respectfully, Applicants disagree.

In order for a claim to withstand scrutiny under 35 U.S.C. § 112, second paragraph, the claim must "set out and circumscribe a particular subject matter with a reasonable degree of clarity and particularity. [However, definiteness] of

claim language must be analyzed, not in a vacuum, but in light of . . . [the] content of the particular application disclosure . . . ." MPEP 2173.02. The Specification clearly describes how the specified printed conductor sections and the contact point cooperate with the other specified elements, namely, the resistors of the voltage divider. Referring to Figure 2, for example, the detection voltage circuit (Nernst voltage circuit) and the pump voltage circuit are coupled to circuit arrangement 32 via the joint supply conductor of electrodes 16 and 38, respectively. In Figure 2, an equivalent circuit diagram illustrating how electrodes 16 and 38 are connected to circuit arrangement 32 is shown. It is clear from the equivalent circuit diagram that electrode 38 is initially connected to a contact point 52 via a printed conductor section 50. Electrode 16 is also connected to contact point 52 via a printed conductor section 54. (Specification, page 6, lines 14-19; Figure 2). Conductor section 50 has an internal resistor R1, conductor section 54 has an internal resistor R2, and conductor section 54 has an internal resistor R3. Resistors R1, R2, and R3 form a loaded voltage divider, the constant current applied to Nernst measuring cell 12 flowing via conductor sections 54 and 56, while pump current I_P flows via conductor sections 50 and 56. (Specification, page 6, lines 25-28; Figure 2). Thus, it is clear how the specified printed conductor sections and contact point cooperate with the other specified elements of the invention.

As regards claim 12, the Final Office Action asserts that it is unclear what constitutes being "downstream" from the Nernst and inner pump electrodes and that it is unclear what constitutes being "directly" downstream from said electrodes. Respectfully, Applicants disagree.

As stated above, "definiteness of claim language must be analyzed, not in a vacuum, but in light of . . . [the] content of the particular application disclosure . . . ." MPEP 2173.02. Further, the mere fact that a term or phrase used in

the claim is not used in the Specification does not mean, necessarily, that the term or phrase is indefinite. There is no requirement that the words used in a claim must match those used in the Specification. MPEP 2173.05(e). The essential inquiry is whether a person having ordinary skill in the art, in light of the Specification, would understand the meaning and scope of a term.

Although the Specification does not specifically recite the phrase "a contact point located **downstream** from the Nernst and pump cells," Applicants respectfully submit that a person having ordinary skill in the art reading the Specification would understand the meaning and scope of "downstream," as that term is used in claim 12. For example, Figure 2 shows an exemplary circuit diagram illustrating how electrodes 16 and 38 may be connected to circuit arrangement 32. It is clear from Figure 2 that electrode 38 is connected to contact point 52 and electrode 16 is also connected to contact point 52. **Contact point 52 is arranged inside probe 10 and is located at a geometric distance "a" from electrodes 16 and 38, respectively. A geometric distance "b" for joint supply conductor section 56 of electrodes 16 and 38 results, corresponding to section a.** (Specification, page 6, lines 16-24). Furthermore, the exemplary embodiments illustrated in Figures 3a and 3b show the contact point 52 arranged inside probe 10 in essentially the same orientation as that of the exemplary embodiment illustrated Figure 2. Thus, the Specification makes clear the meaning and scope of the term "downstream," as that term is used in claim 12.

As further regards claim 12, the Final Office Action asserts that it is entirely unclear what the limitation "the contact point is located directly downstream of the Nernst electrode and the inner pump electrode at a first distance such that a second distance of the joint supply conductor section is of a maximum length" is referring to, namely, that Applicants

have not defined what a "second distance" of the joint supply conductor section is. Respectfully, Applicants traverse.

As stated above with respect to the exemplary embodiment illustrated in Figure 2, contact point 52 is arranged inside probe 10 and is located at a geometric distance **"a"** from electrodes 16 and 38, respectively. A geometric distance **"b"** for joint supply conductor section 56 of electrodes 16 and 38 results, corresponding to section **a**. (Specification, page 6, lines 21-24). Thus, **a** and **b** define two discrete distances, i.e., a first distance and a second distance, each of which are clearly defined with respect to each of the exemplary embodiments of Figures 2, 3a, and 3b.

As further regards claim 12, the Final Office Action asserts that it is unclear what the language drawn to a conductor section having a "maximum length" means. Respectfully, Applicants disagree.

Increasing the length of the joint supply conductor is another way to increase the resistance value of the joint supply conductor section, which means increasing the length of the joint supply conductor section is another way of increasing negative feedback between the Nernst voltage circuit and the pump voltage circuit. (Specification, page 7, lines 4-9). However, as explained above, as the negative feedback increases, the pump current supplied to the pump cell is reduced. If the pump current is reduced below a certain minimum pump current, the pump cell may cease to operate correctly. Therefore, the requirements of the pump cell impose an upper limit on the negative feedback of the Nernst cell, and as such, a maximum length for the joint supply conductor. Thus, the Specification clearly defines the metes and bounds of the term "maximized," as that term is used in claim 12.

For at least the foregoing reasons, Applicants respectfully request that the rejection of claims 6-12 under 35 U.S.C. § 112, second paragraph, be withdrawn.

III. **CONCLUSION**

In light of the foregoing, Applicants respectfully submit that pending claims 6-12 are in condition for allowance. Prompt reconsideration and allowance of the present application are therefore earnestly solicited.

Respectfully submitted,

KENYON & KENYON

Dated: 9/24, 2002 By: for Richard Mayer
Richard L. Mayer
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(by Jay Lu R. No. 36,197)

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Claim 6 has been amended as follows:

6. (Amended) A probe for determining an oxygen concentration in a gas mixture, comprising:

a Nernst measuring cell including:

a Nernst electrode exposed to the gas mixture to be measured via a diffusion barrier, a reference electrode exposed to a reference gas, and a solid electrolyte body arranged between the Nernst electrode and the reference electrode;

a pump cell including:

an inner pump electrode exposed to the gas mixture via the diffusion barrier, an outer pump electrode exposed to the gas mixture, and a solid electrolyte body arranged between the inner pump electrode and the outer pump electrode;

a joint supply conductor section through which the Nernst electrode and the inner pump electrode are connected [at least in some sections] to a circuit arrangement for controlling and evaluating the probe; and

[a joint supply conductor resistor associated with the Nernst electrode and the inner pump electrode and including] a loaded voltage divider[, the loaded voltage divider] including a plurality of resistors that are arranged such that a negative feedback of a Nernst voltage circuit and of a pump voltage circuit is optimized, the plurality of resistors including a joint supply conductor resistor associated with the Nernst electrode and the inner pump electrode.